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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/005,928	12/07/2001	James H. Lee	H-204145	7844

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EXAMINER	
ALEJANDRO, RAYMOND	
ART UNIT	PAPER NUMBER
1745	3

DATE MAILED: 08/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/005,928	LEE ET AL.	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on th cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 December 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *21 and 22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *21 and 22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Priority

1. Applicant's claim for domestic priority under 35 U.S.C. 120 is acknowledged.

Drawings

2. The sheets of drawings, filed on 12/07/01 have been accepted.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 21-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claim 21 recite the limitation "a fuel cell stack" in line 9. There is insufficient antecedent basis for this limitation in the claim. It is unclear whether applicant refer to the same fuel cell stack and/or a second fuel cell stack.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugita et al 4820594 in view of LaPierre et al 6348278.

The present application is directed to a process wherein the disclosed inventive concept comprises the specific pumping; heating, expanding and energy using/removing steps. Other limitations includes the specific steps after heating the fuel cell stack

With respect to claims 21-22:

Sugita et al disclose the following (CLAIM 17):

17. A method of starting a fuel cell power generation system, comprising:

a first stage including the steps of filling a reforming part of a reformer with inert gas; and filling a fuel cell with inert gas, wherein said reformer and said fuel cell are connected by a pipe line;

a second stage including the steps of starting a drive assembly comprising a compressor, a combustor, a turbine and a generator by feeding air from said compressor to said combustor; feeding fuel to said reformer reforming part and from said reformer reforming part to said combustor; and engaging a clutch of said drive assembly when said compressor, said turbine and said generator have attained a predetermined rotating speed;

a third stage including the steps of feeding a high-temperature combustion exhaust gas produced by said drive assembly to a waste heat boiler; feeding water to said waste heat boiler; generating steam in said waste heat boiler; and feeding steam generated in said waste heat boiler to said reformer reforming part where it is mixed with fuel fed to said reformer reforming part;

a fourth stage including the steps of feeding fuel and steam from said reformer reforming part to an anode of said fuel cell; feeding air to a cathode of said fuel cell; and feeding air from said compressor to a reformer combustion part;

a fifth stage including the steps of elevating the temperature of said anode by elevating the temperature of said fuel and steam fed to said anode from said reformer reforming part, by in turn elevating the temperature of said reformer reforming part by combusting said air fed to said reformer combustion part from said compressor; elevating the temperature of said cathode by feeding a high-temperature combustion gas to said cathode from said reformer combustion part and by feeding air to said cathode from said compressor of said drive assembly; recycling a portion of gas exiting said cathode; and feeding a remainder of gas exiting said cathode to said combustor of said drive assembly; and

a sixth stage including the steps of attaining an operational temperature in said reformer and said fuel cell; reducing said feed of fuel from said reformer reforming part to said combustor of said drive assembly; reducing said feed of air from said compressor to said combustor of said drive assembly; and stopping combustion in said combustor of said drive assembly.

18. A method of starting a fuel cell power generation system according to claim 17, wherein said fuel is natural gas, LPG, methanol or gas oil.

* * * * *

Sugita et al further disclose the following (COL 7, line 34 to COL 8, line 9):

In stoppage, approximately reverse procedures to those in start-up are followed. The fuel control valve a123 at the reformer 101 outlet is opened to start feeding fuel to the combustor 117 and to actuate the combustor 117. At this time, if necessary, the air control valve i126 is opened to feed air to the combustor 117. However, the amount of air passed through the control valve i126 is preferably restricted to the necessary minimum because the exhaust gas from the cathode 104 outlet also contains oxygen and the oxygen consumption in the cell decreases with the decrease of the load of the fuel cell, and because it is advantageous for promoting the cooling of the cell to send a larger amount of air to the cathode.

Concurrently with decreasing the load of the cell and with gradual closing the fuel control valve b122, air is sent in a large amount from the air control valve j127 at the compressor 116 outlet to the reformer combustion heating part 112, to cool also the reformer 101.

At the time when the temperature of the reformer 101 and the fuel cell 102 have decreased, the control valves b122, f125 and j127 are completely closed, the control valve i126 is opened, and air is fed to the combustor 117.

Cooling is preferably scheduled such that the reforming reaction in the reformer 101 would stop after coagulation of the molten carbonate in the fuel cell 102 has taken place because it is effective for preventing the evaporation of carbonates.

When the feed of fuel and air to the fuel cell 102 has come to a halt, the atmosphere in the cell anode 103 and the cathode 104 is replaced with inert gas.

In the last stage, at the time when fuel is fed to the combustor 117 through the reformer 101, only the system of the compressor 116, combustor 117, turbine 118, generator 119, and waste heat boiler 120 is in operation,

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and the temperature of the reforming part **113** of the reformer **101** has been decreased to a point at which the reforming catalyst becomes inactive, the control valve **c124** is closed to stop the supply of steam from the waste heat boiler **120**, and subsequently the control valves **x121** and **a123** are closed to stop also the system of the compressor **116**, combustor **117**, turbine **118** and generator **119**.

In light of the above, it is noted that in stoppage, approximately reverse procedures to those in start-up are followed as well as that cooling is also preferably scheduled.

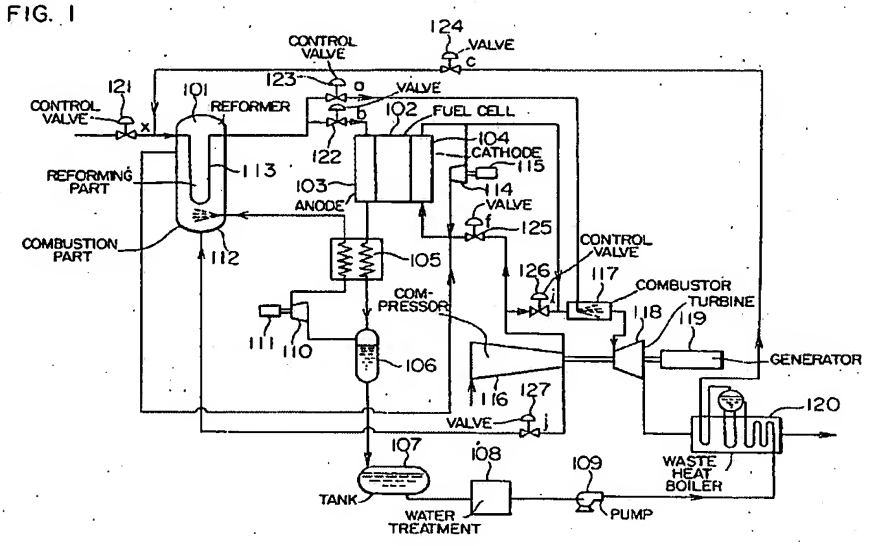
Sugita et al disclose a fuel cell system wherein fuel is used directly as a heating medium for raising the temperature of the system (ABSTRACT). **Figure 1** below shows the fuel cell system comprising a pump 109 which is connected to the waste heat boiler 120 which transfer heat to the water to create steam wherein the heat waster boiler 120 is further connected to the inlet part of the reformer 101 (COL 3, lines 34-42). The fuel cell system comprises the fuel cell 102; the air compressor 116, the turbine 118, the heat boiler 120 (COL 2, lines 53-57).

It is also evident from **Figure 1** that the fuel cell is connected to an expander (turbine 118), thereby delivering the exhaust to the expander. The compressor 116, the turbine 118 and generator 119 are connected with the same power system which is further connected through a clutch with a drive assembly to deliver work (COL 3, lines 14-22). Figure 1 also depicts that the expander is connected to another fuel cell component to use the generated work.

Figure 1 also illustrates that the expander (turbine 118) is in flow communication (connected) with fuel cell through the reformer 101 wherein the fuel cell anode outlet is connected to the heat exchanger 105 and the outlet of heat exchanger is connected to the drum 106 (COL 3, lines 1-11) where they cools the anode outlet exhaust (COL 5, lines 1-10). *Thus, both the heat exchanger 105 and the drum 106 act as a condenser by recovering constituent of*

the anode gas exhaust. Thereafter, the separated water enters water tank 107, then brought to elevated pressure and sent to the waste heat boiler 102 by means of the feed water pump 109 (COL 5, lines 55-62).

FIG. 1



Sugita et al disclose a process for starting-up and cooling a fuel cell according to the foregoing. However, Sugita et al do not disclose the specific step of directing the cooling fluid through a condenser having the condenser fans turned on to remove heat therefrom and to change the gas to the liquid.

LaPierre et al disclose that the fuel cell exhaust stream is directed into a condenser 78 to condense the water vapor and to separate the condensed water vapor from the oxygen depleted air 92 (COL 9, lines 14-18). It is also disclosed that condensed fuel cell liquid 80 is recycled to the reforming reactor as reforming water recycle stream (COL 12, lines 4-10). It is further noted that the exhaust tail gas stream 48 is also preferably passed through a heat exchanger and exhaust tail gas process water condenser 51 for cooling the exhaust tail gas stream and separating water in the exhaust tail gas stream from the other gaseous components (Col 14, lines 37-45). LaPierre

et al further disclose a working simulation wherein the condenser is satisfactorily employed (COL 22, lines 1-12).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to direct the cooling fluid through a condenser having the condenser fans turned on to remove heat therefrom and to change the gas to the liquid of LaPierre et al in the process of starting-up and operating the fuel cell of Sugita et al as LaPierre et al disclose that fuel cell operating fluids can be directed into a condenser to condense the gas and/or vapor and to separate the condensed product from the material depleted exhaust stream. Additionally, the fuel cell operating fluid is also preferably passed through a condenser for cooling the exhaust stream of the fuel cell operating fluid and separating water therein from the other gaseous components. Thus, the condenser functions as both a cooling device and a separating medium. Further, it will be apparent to those skilled in the art that any suitable condensing means for cooling and separating the fuel cell operating fluid may be used that only removes a portion of the fuel gas and the water so that a mixture of both the fuel gas/water in liquid phase be available and directed to serve as the heating/cooling medium consistent with the teachings of Sugita et al. *Moreover, the working fans are implicit features in the teaching of LaPierre et al as it is noted that LaPierre et al do encompass and envisage condensing means which serve to cool the fuel cell operating fluid. Furthermore, it is noted that LaPierre et al clearly envision to use condensers during start-up, stoppage and cooling stages as La Pierre et al teach that the their integrated system is also particularly suited for starting-up fuel cell systems and a working simulation wherein the condenser is satisfactorily employed .*

Double Patenting

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10. Claims 21-22 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 3 of U.S. Patent No. 6365289. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The US Patent'289 claims the following (CLAIMS 1 and 3):

> 1. A process of heating a fuel cell stack during cold startup conditions and thereafter cooling the fuel cell stack during post startup operations, and using waste heat generated by the fuel cell stack during post-startup operation to produce shaft work comprising:
>
> (a) pumping a cooling fluid including a liquid to an elevated pressure,
>
> (b) heating the fuel cell stack by transferring thermal energy from the cooling fluid to the fuel cell stack,
>
> (c) heating the cooling fluid with a second heat source to change the liquid to a gas,
>
> (d) expanding the heated cooling fluid in an expander to produce shaft work,
>
> (e) driving an air compressor with the shaft work to compress air and delivering the compressed air to the fuel cell stack,
>
> (f) directing the cooling fluid through a condenser having condenser fans and wherein the condenser fans are turned off, and
>
> (g) repeating steps (a–f) until the temperature of the fuel cell stack has reached a temperature for operating the fuel cell under post startup conditions and wherein the operation of the fuel cell stack under post-startup conditions produces waste heat, and

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(h) after the temperature of the fuel cell stack has reached the temperature for operating the fuel cell stack under post startup conditions, turning on the condenser fans so that heat is removed from the cooling fluid being directed through the condenser, and

(i) pumping the cooling fluid to the fuel cell stack at an elevated pressure,

(j) cooling the fuel cell stack by transferring thermal energy from the fuel cell stack to the cooling fluid to cool the fuel cell stack and to heat the cooling fluid,

(k) supplying additional heat to the cooling fluid to change the liquid to the gas,

(l) expanding the heated cooling fluid through an expander to produce shaft work,

(m) driving the air compressor using the shaft work to compress air and delivering the compressed air to the fuel cell stack,

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(n) directing the heated cooling fluid through the condenser to remove heat from the cooling fluid and change the gas to the liquid, and

repeating steps (i–n).

3. The process as set forth in claim 1 wherein the step (k) of supplying additional heat to change the liquid to the gas comprises supplying heat from a catalytic combustor, and further comprising a step of supplying additional heat to heat the gas to a higher temperature.

In this case, the application claims appears to be broader or more generic than the patent claim, thus, the application claims are anticipated by the patent claim. Accordingly, a broad limitation is anticipated by a narrow limitation which lies within the broad limitation. *In re Goodman.*

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (703) 306-3326. The examiner can normally be reached on Monday-Thursday (8:30 am - 7:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (703) 308-2383. The fax phone numbers for the

organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Raymond Alejandro
Examiner
Art Unit 1745